

FINDING OF NO SIGNIFICANT IMPACT

Development and Implementation of a Habitat Management Program

The U.S. Fish and Wildlife Service proposes to develop and implement a Habitat Management Program at Pond Creek NWR commensurate with priority wildlife habitat needs and biological objectives of the refuge. This program is designed to achieve the purposes for which the refuge was established, achieve legal mandates, accomplish wildlife and habitat goals/objectives identified in the refuge's CCP and other associated planning documents and contribute to the mission of the Service.

The Service evaluated four alternatives for the implementation of the program. These alternatives are: Alternative (1) Active Forest Management with no Commercial Timber Sales/Commercial Assistance; Alternative (2) Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Silvicultural Harvest Actions (Preferred Alternative); Alternative (3) Active Forest Management with Conversion of Pine Plantations and Implementing Even-Age, Silvicultural Harvest Applications; Alternative (4) Natural Succession (No Action).

Alternative 1 includes management actions by refuge staff only to restore hydrological processes, remove off-site, monoculture loblolly pine plantations established by previous owners and increase diversity and productivity of hardwood forests. Funding and staffing constraints, both now and those anticipated, prevent significant progress being made with this alternative to correct critical deficiencies necessary to achieve refuge priority wildlife objectives. Alternative 2 includes actions that restore altered/degraded habitats through use of customary Service timber sale procedures. This approach is the preferred alternative and has the best potential to restore significant percentages of the refuge's forested wetland habitats to regain forest diversity and habitat productivity. Implementation of silvicultural actions (individual tree selection techniques designed to create uneven age, highly diverse stands) would be based upon site specific needs identified through scientific review of current state of the art knowledge of priority wildlife species habitat requirements. Alternative 3 also considers actions that restore degraded/altered through customary Service timber sale procedures. This approach, however, is based on implementation of treatments to develop even age stand conditions within forested habitats and relies upon using clear cuts as the preferred silvicultural technique. Application of this technique would be based on strict area control established through a 100 year rotation age with small clear cuts (20-100 acres) used to achieve uniform stands of similar habitat evenly distributed throughout the forest. Specific habitat needs of priority wildlife species would be present in distinct blocks of similar habitat somewhere within the forest at any given time. This approach has less potential than the preferred alternative to restore significant percentages of habitat and achieve maximum forest diversity, integrity and productivity. Alternative 4 relies upon natural plant successional processes. This approach provides for no active silvicultural management to address degraded conditions resulting from forest industry practices implemented prior to Service ownership. Biological parameters identified as needed to achieve optimum

wildlife habitat conditions would exist on only a small percentage (1-5 percent) of forested habitats preventing refuge objectives, legal mandates and Service mission from being met.

Each of the alternatives proposed were analyzed in the Environmental Assessment (copy attached). Alternative 2, Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Silvicultural Harvest Actions, was selected as the preferred alternative. This alternative was selected over the other proposals because it is economically feasible (egg. can be accomplished within current and anticipated funding and staffing levels) and allows for maximum habitat restoration of degraded forest habitats, will achieve refuge purpose, refuge goals/objectives, legal mandates and contribute to the mission of the Service. This alternative has minimal potential for short or long term negative impacts to the environment and wildlife resources of the refuge due to the low intensity/low impact nature inherent in individual tree selection techniques. Habitat improvement through the preferred alternative would be conducted under strict biological guidance to achieve biological and habitat objectives. This alternative would have only negligible adverse effects, if any, on the environment, cultural resources, listed species, or other refuge programs. It fully meets the objectives and goals for which the refuge was established and would contribute significantly to the Service Mission. A program developed under this alternative would provide the best opportunity for social/economic enrichment for the community. It also most closely follows the guidance provided by the Refuge's Comprehensive Conservation Plan which directs that development of a habitat management program be implemented on this refuge.

Implementation of the alternative selected by the Service will provide for the restoration of highly productive habitats and their retention. Annual evaluation of the program will ensure the intent of the selected alternative is attained.

The proposal is not expected to have any significant adverse effects on wetlands or floodplains, pursuant to Executive Orders 11990 and 11988.

The proposal has been thoroughly coordinated with all interested and/or affected parties. Parties contacted include: Arkansas Game and Fish Commission, Relevant Federal, State and County Offices and Officials, CCP Planning Committee, and Members of the General Public.

A formal public review and comment period of the draft Environmental Assessment and Habitat Management Plan was implemented through multiple news releases and various regional media outlets. A total of eight individuals and organizations responded by requesting copies of the draft documents for review. A letter of support for the proposed action was received from the Arkansas Game and Fish Commission. No other written or verbal comments were received.

Therefore, it is my determination that the proposal does not constitute a major Federal action significantly affecting the quality of the human environment under the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. This determination is based on the following factors (40 CFR 1508.27):

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment. (EA, pages 9-29).
2. The actions will not have a significant effect on public health and safety. (EA, pages 9-29).
3. The project will not significantly effect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas. (EA, pages 9-29).
4. The effects on the quality of the human environment are not likely to be highly controversial. (EA, pages 9-29).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment. (EA, pages 9-29).
6. The actions will not establish a precedent for future actions with significant effects nor does it represent a decision in principle about a future consideration. (EA, pages 9-29).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions. (EA, pages 9-29).
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources. (EA, pages 9-29).
9. The actions are not likely to adversely affect endangered or threatened species, or their habitats. (EA, pages 9-29 and Intra-Service Section 7 Biological Evaluation).
10. The actions will not lead to a violations of federal, state, or local laws imposed for the protection of the environment. (EA, pages 9-29).

References: Pond Creek NWR Habitat Management Environmental Assessment
Pond Creek NWR Habitat Management Plan
Pond Creek NWR Comprehensive Conservation Plan and EA
Pond Creek NWR Habitat Management Plan Intra-Service Section 7 Biological
Evaluation


Regional Director

11/3/03
Date

ENVIRONMENTAL ASSESSMENT
HABITAT MANAGEMENT PLAN
for
POND CREEK NATIONAL WILDLIFE REFUGE
Sevier County, Arkansas

Date:

August 15, 2003

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REGION 4

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

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Date: 02/10/03

PROJECT NAME (Grant Title/Number): Pond Creek Forest Habitat Management Plan

I. Service Program:

☐ Ecological Services

☐ Federal Aid

☐ Clean Vessel Act

☐ Coastal Wetlands

☐ Endangered Species Section 6

☐ Partners for Fish and Wildlife

☐ Sport Fish Restoration

☐ Wildlife Restoration

☐ Fisheries

☒ Refuges/Wildlife

II. State/Agency: Arkansas/U.S. Fish & Wildlife Service

III. Station Name: Pond Creek National Wildlife Refuge

IV. Description of Proposed Action (attach additional pages as needed):

Pond Creek NWR is an extensive wetland complex comprised of the forested overflow bottoms and riparian forests of the Little and Cossatot Rivers. The refuge is approximately 95 percent forested with small areas of open water, shrub swamps, beaver ponds, open marsh, and roads. The forested matrix contains natural second-and third-growth bottomland forests, with inclusions of a loblolly pine component on high terraces, stringers of riparian forests. Over 6,000 acres of the refuge is covered with loblolly pine plantations. These plantations are not native to the refuge. The proposed action is to implement a habitat management program designed to improve and maintain optimum habitat conditions for listed species, migratory birds (waterfowl and forest land birds) and resident wildlife. One of the needed actions is to convert these off site plantations to a bottomland hardwood community by removing the pines using normal timber harvest operations over an eight to ten year time frame. Acres that do not have sufficient desirable advanced regeneration will be planted with nursery grown seedlings of indigenous species.

TABLE OF CONTENTS

I. Purpose and Need for Action	1
A. Need for Action	1
B. Purpose of Action	1
C. Issues and Concerns	3
D. Coordination and Consultation	4
II. Alternatives Including the Proposed Action	4
A. Alternative 1. Active Forest Management no Commercial Timber Sales	5
B. Alternative 2. Active Forest Management Using Individual Tree Selection Harvest and Uneven-Age-Management (Preferred alternative)	6
C. Alternative 3. Active Forest Management, Even-Age-Management	7
D. Alternative 4. Natural Succession (No Action)	8
III. Affected Environment	
A. Refuge Characteristics	8
B. Biological Environment	9
C. Social Environment	9
IV. Environmental Consequences	
A. Alternative 1. Active Forest Management, no Commercial Timber Sales	10
B. Alternative 2. Active Forest Management Uneven-Age-Management, Selective Harvest (Preferred Alternative)	15
C. Alternative 3. Active Forest Management Even-Age Management	19
D. Alternative 4. Natural Succession (No Action)	24
V. Re-evaluation of Plan	27
VI. List of Preparers	27
VII. Literature Cited/Consulted	27
Table 1. Responsiveness of Alternatives to Issues and Concerns	29
Table 2. Environmental Consequences of the Alternatives	31

I. Purpose and Need for Action

A. Need for Action

Pond Creek National Wildlife Refuge (NWR) consists of bottomland hardwood habitats developed through natural environmental processes. The forested habitats that have developed are extremely dynamic and diverse in species composition and structure. However, considerable alterations to portions of this wetland forest system over the past 30 years has significantly degraded present habitats and their wildlife productivity. The two most prominent factors that have contributed to habitat degradation are off site water storage/flood control measures implemented by the U.S. Army Corps of Engineers (COE) through dam construction projects on the main stems and major tributaries of the Little and Cossatot Rivers, and activities associated with intense forest management practices conducted by the forestry industry prior to refuge ownership. It is recognized that alterations of flood control projects in pursuit of restoring natural hydrological processes is beyond the scope of the proposed action. However, negative impacts that have resulted from past timber production based forest management activities can be minimized or restored through an active and biologically based forest habitat management program.

The integrity of the forested ecosystem of Pond Creek NWR has been negatively affected during past ownership through forest management practices primarily because of the following: (1) on-site altered hydrology due to previously implemented forest industry management actions (i.e. road construction, site preparation for establishment of off-site species, hydrological impacts associated with beaver activities, blocking, re-routing and establishing alternate routes for drainage), (2) stand conversion of bottomland tree species to off-site loblolly pine (6,225 acres) and (3) reduction of stand structure and species diversity through high-grading of the remaining bottomland hardwood stands (approximately 21,000 acres). As a result of timber production motivated habitat modifications, all biotic aspects of the forest community have been directly and/or indirectly affected to some degree. Ongoing management efforts are addressing aspects of alterations relative to road construction and congestion of natural drains. However, other modifications described require appropriate action through implementation of various silvicultural management techniques in order to achieve the wildlife objectives contained in legal mandates, the refuge's Comprehensive Conservation Plan (CCP) and various other documents relative to wildlife productivity on National Wildlife Refuges (i.e. North American Waterfowl Management Plan, Partners in Flight Plans, West Gulf Coastal Plain Joint Venture Area, etc). In its current conditions, these forests will not achieve the established wildlife objectives of this refuge.

B. Purpose of Action

A formal plan of action to address habitat restoration and enhancement within the forested ecosystem of Pond Creek NWR is necessary. The purpose of the plan of action will be to provide forest management actions to restore forested wetland functions and native species composition

on altered/degraded sites (where practical) and provide for improved habitat productivity/protection for endangered or threatened species, priority suites of migratory birds (waterfowl and forest land birds) and other wildlife species. These are the wildlife and habitat priorities established for this refuge through various authorities and documents detailed below. Such action will achieve purposes for which the refuge was established, achieve legal mandates, accomplish goals/objectives identified in the refuge's CCP and other associated planning documents and contribute to the mission of the Service. The proposed plan of action will seek to promote native floral and fauna diversity and restoration of hydrological functions, to the extent practical, through active habitat management initiatives that achieve refuge wildlife habitat priorities and objectives. The plan of action will also seek to ensure that restored integrity and habitat conditions achieved will be maintained long term.

As part of the U.S. Fish and Wildlife Service, the mission of the National Wildlife Refuge System is to *"administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."* (National Wildlife Refuge System Improvement Act of 1997). This act requires, in general, that refuges restore and maintain the biological integrity, diversity and environmental health necessary to achieve this mission and the purposes established for each individual refuge. Sound natural resource management practices are called for to provide optimum wildlife habitats and create an environment where compatible public use will be encouraged.

The refuge was established under the authority of the Emergency Wetlands Resources Act of 1986, which calls for:

"...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international treaty obligations contained in various migratory bird treaties and conventions..." (16 USC 3901 (1b), 1100 State 3583).

Also, the Omnibus Parks and Public Lands Act of 1996, which authorized the transfer of land from Weyerhaeuser Company to the Service for inclusion into Pond Creek NWR required the completion of a Comprehensive Conservation Plan (CCP) which:

"...recognize the important public purposes served by nonconsumptive activities, other recreational activities, and wildlife-related public use, including hunting, fishing, and trapping."

Furthermore, this act requires the CCP to:

"...shall permit, to the maximum extent practicable, compatible uses to the extent that they are consistent with sound wildlife management, and in accordance with the National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee) and other applicable laws."

The approved Pond Creek NWR CCP, completed in 1999, established the following vision for the refuge as a guide to its present and future management direction.

A model refuge that protects and manages biological diversity for the enjoyment and benefit of present and future generations.

In addition, the CCP identifies various step down plans that must be developed to direct the management of this refuge including the development and implementation of a forest habitat management plan. Developing such a plan and implementing the required silvicultural management actions was identified as a critical element to achieving refuge and Service goals and objectives. Specific goals, objectives and strategies within the CCP provide habitat management guidance and are presented in Section D of the draft Forest Habitat Management Plan. Existing habitat conditions within the forested habitat of the refuge are not adequate nor are they likely to become adequate to meet biologically defined wildlife habitat targets, thus the intent of the proposed plan of action (preferred alternative) is to correct deficiencies in order to achieve the purposes for which the refuge was established, meet legal mandates, fulfill CCP objectives and contributes to other important conservation plans identified in I.A. above.

C. Issues and Concerns

Multiple meetings (public and inter/intra agency) have been held to identify issues and concerns associated with the establishment and management of Pond Creek NWR. Many of the comments amassed during these meetings were relevant to forest habitat management. The last formal public meeting was held in 1999, but multiple opportunities have been provided to the public since that time for public involvement and comment concerning all refuge plans, including the forest habitat management plan (FHMP). Issues and concerns expressed during formal public meetings continue to be reiterated to staff during interactions with refuge users. These staff/public interactions occur during compliance checks, informal encounters on and off refuge and during group presentations conducted by staff. Members of the original planning team that consisted of community, county, state and federal representatives also continue to recognize these issues and concerns as applicable. The cooperation of many entities were utilized to develop the scoping process, these are; Arkansas Game and Fish Commission, United States Army Corps of Engineers, The Nature Conservancy, U. S. Fish and Wildlife Service Wildlife Habitat Management Division biologists, U.S. Fish and Wildlife Service Ecological Services Division biologists, U. S. Fish and Wildlife Service staff from multiple Service Regions, United States Geological Survey, Biological Resource Division; County officials, Natural Resource Conservation Service, Farm Services Agency, Arkansas Extension Service, research scientists from various universities, and local residents. Historic, as well as proposed uses, were evaluated for compatibility, wildlife-dependency and management implications. The CCP provides a thorough list of these issues/concerns. An abbreviated list of some of the original issues and concerns relative to forest habitat management on the refuge are listed below. While the summary statements presented may not be identical to the original statements given, they accurately reflect the intended meaning of the comments received.

The following issues reflect the primary concerns of the public, partners and state/federal agencies regarding forest habitat management on the refuge:

- Preserve archeological sites on the refuge.

- Protect threatened and endangered species.
- Increase waterfowl populations by restoring native bottomland hardwoods.
- Are habitat improvements for non-game forest dwelling birds going to be developed?
- Improve current habitat for resident wildlife species.
- Off-site pine plantations should be converted back to bottomland hardwoods community!
- Change rotation of pine harvest regime for conversion of these pine plantations from a 30 year period to a faster 10 year period.
- Trappers are needed to reduce the beaver populations!
- Bird rookery sites should be undisturbed!
- Bottomland hardwood stands should have appropriate basal areas.
- Current staffing and funding limits activities performed on refuge.

The approved CCP and Environmental Assessment, completed at the end of 1999, identifies and addresses forest habitat management as a critically needed tool that must be implemented on Pond Creek NWR. Forest habitat management will assist in achieving refuge purposes and will support the Service's mission to preserve wildlife populations for future generations of Americans.

D. Coordination and Consultation

Intra and inter agency coordination and consultation regarding forest habitat management on Pond Creek NWR has been conducted through meetings and informal discussions. Local county governments, multiple Arkansas State Agencies and the Army Corps of Engineers (COE) have been consulted on a regular basis to seek input and incorporate partnerships regarding management objectives proposed on the refuge. Support for forest habitat management as a management tool on the refuge has been endorsed by these entities, especially Arkansas Game and Fish Commission staff, U. S. Fish and Wildlife Service and non-Service forest land bird experts and local county governments. The general public has had input and been informed on the general objectives of the forest habitat management plan, through multiple public meetings held during CCP development and formal/informal contacts by staff.

This EA and the draft Pond Creek FHMP underwent extensive internal review by all Service Divisions prior to release to the public. On July 10, 2003 the documents were released for public review and comment. News releases were sent to multiple regional media outlets announcing availability of the documents for review. A 30 day public comment period was established and

announced along with plan availability through repeated media runs of the release provided. Eight requests for copies of the plan were received along with three calls seeking further clarification about the purpose of the plan. No comments from the public were received by the close of the comment period. Local government offices/officials and state agencies were provided copies of the draft documents. The only response received was a letter from the Arkansas Game and Fish Commission supporting the documents as written.

II. Alternatives Including the Proposed Action

The following section presents various alternatives (management approaches) that were considered in order to achieve the needed forest habitat conditions for accomplishing mandated wildlife objectives. Table 1 presents a summary of the responsiveness of the alternatives to the issues and concerns identified in Section I.C. Alternative 2 is the Preferred Alternative.

Alternative 1. Active Forest Management with no Commercial Timber Sales/Commercial Assistance

Under this alternative habitat management actions implemented to achieve refuge habitat objectives for priority wildlife species would be conducted only by refuge staff through Service funding sources. Actions would include efforts to implement restoration of altered/degraded habitats (i.e. sites affected by altered natural drainage, excessive drainage, high-graded harvest regime and conversion to off-site tree species) to obtain forest properties determined essential to fulfill wildlife management goals and objectives and achieve legal mandates within the constraints of available funding and staffing.

Activities associated with hydrological restoration would include beaver dam removal, culvert replacement and filling of lateral ditches/canals established to promote increased drainage. These activities would be conducted using heavy equipment and explosives as necessary. Bottomland hardwood restoration and promotion of forest habitat attributes essential to ensure minimum productivity for priority wildlife species would be conducted by available staff using planters, chainsaws, crawler tractors, trackhoes and/or chemical applications. Forest management activities would be initiated in both pine and hardwood stands. Loblolly pine plantations, considered non-native plant communities, would be cleared using heavy equipment (push, pile and burn or allow to rot) and converted back to bottomland hardwood species through planting and/or natural regeneration. Habitat improvement projects in hardwood stands would be applied under an **uneven-age management** strategy to ensure retention of various age classes on a micro scale primarily by chemical tree injection or limited mechanical shearing of undesirable stems to correct species compositions. Improvement projects under this approach would seek to attain diversified internal stand structure, manipulate stand species composition, stimulate regeneration and ensure optimum spatial elements are achieved through selective removal of individual trees. This approach would be dictated by conditions within individual stands rather than predetermined application of silvicultural actions to a designated area (area control). All forest products removed during restoration and habitat improvement projects would be piled or left standing and

allowed to decay naturally in the field. It is estimated that a maximum of 100-150 acres could be treated annually at current staffing and funding levels or about 2,250 acres over the 15 year life of this plan. Although this alternative might achieve refuge habitat management objectives on the areas actually treated, lack of adequate funding would restrict scale of implementation and progress. Time lags generated by lack of funding and manpower would prevent achievement of refuge objectives. Pursuit of habitat initiatives in the absence of additional resources would be insignificant in scope to contribute significantly in the achievement of refuge management objectives.

Alternative 2. Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Silvicultural Harvest Actions Necessary to Achieve Wildlife Objectives (Preferred Alternative)

Under this alternative, habitat management actions to achieve refuge habitat objectives for priority wildlife species would be implemented using standard approved Service timber sale procedures for excess forest products. Actions would include restoration of altered/degraded habitats (i.e. sites affected by inhibited natural drainage, excessive drainage, high-graded harvest regime and conversion to off-site tree species) to obtain forest properties determined essential to fulfill wildlife management goals and objectives and achieve legal mandates.

Activities associated with hydrological restoration would be similar to Alternative 1 and include beaver dam removal, culvert replacement and filling of lateral drains constructed to assist in pine plantation establishment. Conditions incorporated as part of timber sale permits would require hydrological restoration activities by the sale permittee within sale areas.

Silvicultural activities (wildlife habitat improvement harvest activities) would be conducted through written and approved prescriptions based on biological parameters identified by Service and non-Service wildlife experts for the purpose of achieving optimum wildlife habitat conditions for priority wildlife species (see Sections III. A. and B. of the draft FHMP). Forest restoration and habitat improvement projects would be conducted in both off-site pine plantations and existing bottomland hardwood stands. Existing pine plantations would be liquidated and reforested (planted) to on-site bottomland hardwood species in a 6 - 10 year period. All excess forest products removed would be sold. Habitat improvement projects in hardwood stands would be applied under a modified **uneven-age management** approach to ensure retention and development of multiple tree age classes on a micro scale throughout the existing forest utilizing individual tree and group selection actions (up to 1 - 2 acres) to achieve desired stand conditions. All stems to be removed in any specific silvicultural action would be marked for removal by refuge foresters and biologists following guidelines contained in individual forest stand prescriptions, insuring accomplishment of the objectives of the action while minimizing potential negative impacts. The draft FHMP presents a treatment entry schedule developed for this alternative which covers the entire refuge forest over the 15 year life expectancy of this plan. In

effect, this means the entire refuge forest would be examined by systematic data gathering and decisions made on improvements, if any, needed to achieve desired habitat conditions in each stand. Improvement actions under this approach would seek to attain diverse internal stand structure, manipulate stand species composition, initiate regeneration and ensure optimum spatial elements are achieved through selective harvest of individual trees and establishment of small openings to provide needed habitat conditions based upon current state-of-the-art knowledge concerning desired conditions for targeted species. All actions implemented would also focus upon efforts to restore natural forest community integrity (species compositions, age class distributions, etc) to the extent possible and within the constraints of achieving refuge purposes and refuge wildlife objectives. Implementation of a management action would be dictated by stand conditions within a particular area relative to needed habitat conditions rather than predetermined application of silvicultural actions to a designated area or forest associated with area control or a rotation age. Since decisions to implement treatments and types of treatments implemented would be based solely upon habitat conditions present at any given location, a rotation age (normally used in forest management as an economic parameter to dictate harvest) would not be established. Treatments applied would be totally based upon priority wildlife habitat needs, not economic return. This approach would provide the maximum amount of optimum habitat for priority wildlife species throughout the forested ecosystem of the refuges and be conducted based on a 15 year planning/entry cycle.

Alternative 3. Active Forest Management with Conversion of Pine Plantations and Implementing Even-age, Silvicultural Harvest Procedures

Under this alternative habitat management actions implemented to achieve refuge habitat objectives for priority wildlife species would be effected using customary Service timber sale processes for removal of excess forest products. Actions would include restoration of altered/degraded habitats (i.e. sites affected by altered natural drainage, excessive drainage, high-graded harvest regime and conversion to off-site tree species) to obtain forest properties determined essential to fulfill wildlife management goals and objectives and achieve legal mandates.

Customary Service timber sale procedures for removal of forest products would be utilized. Special conditions incorporated as part of timber sale permits would require hydrological restoration activities within sale areas to restore hydrological functions as directed by refuge staff during stand improvement operations. Silvicultural activities would be conducted following approved prescriptions based on biological parameters identified for the purpose of achieving desired wildlife habitat conditions within constraints of the physical limitations inherent to even age management. Forest restoration and habitat improvement projects would be conducted in both off-site pine plantations and existing bottomland hardwood stands. Existing pine plantations would be liquidated and reforested (planted) to bottomland hardwood species. All forest products removed would be sold. Habitat improvement projects in hardwood stands would be applied under an **even-age management approach**. This approach would be conducted through a implementation of small clear-cuts (20-100 acres) to achieve groups of uniform stands evenly

distributed within the forest. These groups of stands could be expected to provide at least one or more sets of habitat parameters needed for some individual priority wildlife species within the rotations age for that stand. This approach to habitat management creates blocks of similar habitat within each treatment site with order of entry/timing of treatments arranged so as to provide an array of habitat conditions within the forest. In most cases, desired habitat conditions for priority wildlife species could be found somewhere within the forest at any given time but would be regulated to specific locations within previous treatment areas. Silvicultural applications under this approach would be based on a pre-determined rotation cycle (egg. 100 years) rather than site specific habitat needs. Treatments applied would be totally based upon rotation cycle to meet priority wildlife habitat needs, not economic return from the sell of forest products. With a 100 year rotation length, approximately 15 percent of the existing 21,000 acres of hardwood stands (or 3,150 acres) would be treated during the 15 year life expectancy of this plan. Total area treated, including about 6,000 acres of pine plantations, would be approximately 9,000 acres.

Alternative 4. Natural Succession (No Action)

Under this alternative, habitat management would be through no active silvicultural applications. Refuge habitat objectives for priority wildlife species would be left to natural plant succession and gap dynamics associated with stem mortality. Over time, some minimal restoration of altered/degraded habitats (i.e. sites affected by altered natural drainage, excessive drainage, high-graded harvest regime and conversion to off-site tree species) could be achieved with this approach. However, forest properties determined essential to fulfilling wildlife management goals and objectives and achieve legal mandates would be subject to natural processes and beyond management control.

Habitats degraded through excessive inundation or inhibited drainage would regenerate over time to floral species adapted to altered site conditions. Established off-site, monoculture loblolly pine plantations would degenerate over time (100-120 years - loblolly pine is not a climax species within the flood plain forest at Pond Creek) and convert to mixed pine/hardwood stands. Successional processes in existing hardwood stands would move rapidly toward a closed canopy forest with complete canopy closure occurring in approximately 15 years. Biological parameters identified by Service and non-Service wildlife experts for the purpose of achieving optimum wildlife habitat conditions within the refuge forest would be present only as a result of storm events and other natural processes and exist as a very small percentage of the total area (perhaps 1- 5 percent) at any given time.

III. Affected Environment

A. Refuge Characteristics

Pond Creek NWR is a relatively new refuge having been established under the Emergency Wetlands Resources Act. The refuge became the 501st refuge administered by the U.S. Fish and

Wildlife Service on August 8, 1994 under the name "Cossatot National Wildlife Refuge". This name was changed in 1997 at the request of the public and the CCP planning team. Pond Creek NWR consists of approximately 28,000 acres of contiguous forested lands and has an approved acquisition boundary of approximately 30,500 acres.

The refuge is located in Sevier County, in the flood plain and overflow bottoms formed at the confluence of the Little and Cossatot Rivers. The most important aspect of the refuge is its large, functioning forested wetland ecosystem. Although many hydrological alterations have occurred on and off the refuge (i.e. COE dams, drainage to accommodate pine cultivation, road development) that impact the processes that maintain the refuge's ecosystem function and plant communities, these forested wetlands are naturally dynamic and display a high resiliency to disturbance due to the nature of riverine processes.

This extensive wetland complex is approximately 95% forested with small areas of open water, shrub swamps, beaver ponds, open freshwater marshes and roads. Forest stands have been selectively harvested since settlement which resulted in little change in the natural features of the forest. However, more recently, parts of the forest have experienced heavy disturbance because of conversion of over 6,000 acres of bottomland hardwood forest to pine plantations and a heavy high grade harvest which removed most of the high quality merchantable timber (implemented prior to Service ownership). Although the forest has been altered, its resilience can already be observed.

The refuge is largely undeveloped, yet it is a popular destination for outdoor enthusiasts. Approximately 18,000 public visits occur annually. The majority of these visits are consumptive and involve hunting and fishing activities.

A total of 14 archeological sites have been identified on Pond Creek NWR. The location(s) of these sites have been determined and marked on maps maintained in refuge files. The Pond Creek CCP and EA provides significant detail concerning archeological resources present which appear to be native American sites. No National Register sites currently exist.

B. Biological Environment

The plant communities contain a high diversity of species throughout the refuge and consist primarily of flood-plain adapted species. These forest species change rapidly over short distances in response to small elevational differences and hydrologic regimes. In general, bottomland hardwood ecosystems are very productive habitats for a wide array of fish and wildlife species. The refuge is no exception. Bobcat, white-tailed deer, turkey, squirrels, rodent sp., wading birds, neotropical migrant songbirds, raptors, waterfowl, fish sp., amphibian sp. and reptile sp. are present throughout the refuge. All game species on the refuge are present in sufficient numbers to sustain a controlled harvest. Listed species known to be present on the refuge or use area habitats and streams in southwest Arkansas include the American bald eagle (threatened), Ouachita rock pocketbook mussel (endangered), Leopard Darter (threatened), pink mucket pearly mussel

(endangered), American alligator (threatened by similarity of appearance) and American burying beetle (endangered). Pondberry is the only plant thought to be present that is a listed species. Little or no information is available to provide population indices for most of these species.

Readers are referred to Section II. of the draft FHMP which provides a detailed discussion of the affected environment.

C. Social Environment

Sevier County is a predominantly rural county that is somewhat economically depressed. The leading industries in the county are poultry products, forest products and agriculture (Pond Creek CCP 1999).

IV. Environmental Consequences

All alternatives pose potential short-term and long-term impacts to various physical, biological, historical, economical and social facets of the environment. The impacts associated with these parameters are considered below. Alternative 2 is the Preferred Alternative. Table 2 presents an examination of the environmental consequences of the alternatives considered.

A. Alternative 1. Active Forest Management with no Commercial Timber Sales/Commercial Assistance

Soils

Positive impacts include lowered soil acidity levels on treated sites currently supporting off-site pine plantations. Restoration of these areas to native bottomland hardwood species should restore soil biochemistry to its natural state and provide long-term indirect benefits to soil invertebrates, water chemistry and native vegetation associated with the affected areas. Actual treated area would not exceed 150 acres per year due to available funding and staffing which is not expected to change significantly.

This alternative could potentially have minor negative impacts due to the operation of equipment used to conduct tree removal/habitat improvement activities. Direct impacts could result from soil compaction or rutting in areas of high equipment use. The potential for negative impacts from equipment use outlined by this alternative are increased as a push/dig type removal of standing trees and piling of the removed stems would inherently result in greater soil disturbance. To reduce potential impacts, habitat improvement activities would be conducted only during summer months when dry conditions exist. Best Forest Management Practices (BMP), buffer zones around permanent water areas and stream side management zones would also be applied to reduce potential impacts.

Soil Invertebrates

Long-term indirect benefits due to restoration of wetland functions through hydrology and forest restoration. Short-term minor negative impacts associated with use of equipment to remove stands of pine and group tree removal in hardwood stands due to push/dig approach, push piling of fallen tree stem and soil compaction.

Hydrology and Water Resources

Actions associated with this alternative would provide opportunities to restore hydrological functions in off-site pine plantations and throughout hardwood stands, where practical. During forest improvement activities, man-made lateral ditches and canals enhancing drainage would be filled-in using existing spoil from their creation. Natural drainages plugged or altered from past silvicultural activities would also be restored to ensure conditions associated with unnatural inundation do not persist and further degrade existing forest habitats. Restoration of these wetland functions would provide long-term and direct positive contributions to water resources through filtration of sediments and reduced sedimentation from off-site activities. Possible minimal benefits to the protection of the regional aquifer are also anticipated. Internal forest restoration activities would be achieved in conjunction with stand treatment efforts. Maximum area restored would be approximately 2,250 acres during the life of this plan.

Short-term negative effects associated with this alternative include water quality issues associated with increased siltation caused by push/dig and pile activities habitat improvement activities. Attempts to minimize effects would be conducted through planning and utilization of BMP's and stream side management zones. Timing, intensity, fragility of site, etc. would be considered thoroughly to minimized impacts prior to forest improvement activities.

Aquatic vertebrates and invertebrates

Long-term and indirect positive effects due to restoration of wetland functions through hydrological and forest improvement activities completed on about 2,250 acres.

Possible short-term and direct negative effects associated with this alternative potentially include water quality issues associated with sedimentation caused through push/dig and pile activities. The potential for negative impacts are increased through this alternative. These impacts would be minimized through planning and utilization of BMP's and stream side management zones and are not considered significant. Timing, intensity, site location, etc. would be considered thoroughly prior to implementation of habitat improvement activities.

Threatened and endangered species (T&E)

Most T&E species within this part of the state are riverine dependent and only occur in river systems or permanent water areas (mussels, leopard darter, alligator). Impacts and precautions identified relative to aquatic vertebrates and invertebrates apply to the consideration of potential

impacts of these species. Other T&E species (American bald eagle) may be directly impacted as a result of disturbance during silvicultural applications but such disturbance is not likely unless nesting is initiated on the refuge (currently does not occur). Nest surveys will be conducted on the treatment area prior to implementing actions. Eagles are most often present during the winter months when applications would not be applied. This species should benefit indirectly in the long-term as the proposed action would increase habitat diversity and productivity (i.e. increased availability of prey and habitat features attractive for nesting - super-emergent canopies). Impacts to other T&E species (pondberry and American burying beetle) are not anticipated. Pondberry occurs in wet depressions with sandy soils. Any sites identified subject to these specific site conditions would be excluded from any active silvicultural applications. Furthermore, all sites that even remotely might contain pondberry would be surveyed by Service biologists for its presence prior to implementing treatment actions. The range of the American burying beetle is within the affected area but this species has not been identified on the refuge or within this immediate area.

Possible short-term negative impacts could occur due to reduced rate/scope of proposed habitat improvement/restoration operations (i.e. potential for degraded habitats to continue to exist for an extended period).

Migratory waterfowl

This alternative would indirectly benefit waterfowl in a small way through increased productivity and usability of forests habitats. Restoration of wetland functions and increasing habitat productivity (i.e. removal of off-site pine, increasing composition of mast producing species, retention of cavity trees and tree species prone to produce cavities) would be increased under this alternative on about 2,250 acres during the life of this plan.

Significant long term negative impacts will occur due to reduced rate/scope of proposed habitat improvement/restoration operations (i.e. potential for degraded habitats to exist for an extended period) and would prohibit achieving refuge objectives. At the potential rate of conversion of pine plantations for this alternative (100 acres/yr) it would take in excess of 60 years to remove these stands. These sites would remain in a non-productive state across this time resulting in direct negative impacts to habitat productivity and achieving refuge waterfowl objectives.

Migratory songbirds

This alternative would directly benefit migratory songbirds by increasing habitat productivity. However, these benefits would be insignificant due to the small scale of habitat improvement work that could be accomplished annually. Under this alternative unproductive habitats (pine monoculture,) would be removed and converted back to native tree species used by migrant songbirds. Hardwood stands decreased in productivity by past silvicultural practices would be improved through push/dig habitat improvement applications that address internal structure of the forest to maximize horizontal and vertical structure, develop spatial elements considered optimum for songbird use, promote diversity of forest species composition and age classes, and that provide

“patchiness” (i.e. reproduction clumps coupled with early Successional stage plants in relation to closed canopy or open stand conditions) throughout the forest. These components, identified critical to productive songbird habitat, would be increased on a micro scale based on site specific needs.

Negative short-term indirect impacts would result under this approach as a result of possible localized disturbance during applications in late summer. Most nesting would have ceased by the onset of habitat improvement applications, therefore these impacts are believed to be negligible. Additional short-term impacts may result from a loss of connectivity or fragmentation created by removal of pine plantations. These impacts would be minimized by conducting removal over an extended period and due to the release of hardwood regeneration in the under story of many of the plantations to be treated. The effects of connectivity would be of a lessor impact under this alternative as current funding and staffing resources would only allow for minimum habitat improvement/restoration annually (approximately 100-150 acres annually). Loss of connectivity would not occur in treatments applied to hardwood stands due to design of applications.

Significant negative impacts would occur due to reduced rate/scope of proposed habitat improvement operations (i.e. potential for degraded habitats to continue to exist for an extended period). The physical limitations of treating only 100-150 acres per year would result in most of the refuge forest continuing in undesirable conditions for decades. Plant successional changes routinely result in productive hardwood forest stands attaining crown closure within 10-15 years following treatment. Given this fact, this action would be capable of providing only 1,200-1,500 acres of suitable forest bird habitat for priority bird species over the life expectancy of the habitat management plan since the remainder of the acreage treated (700 - 1,000 acres) would probably revert to less than desirable conditions during this time period.

Colonial nesting birds

Impacts to colonial nesting birds would negligible under this alternative. Some minor indirect benefits may be associated with restoration of hydrological functions. Negative impacts are not anticipated as applications or treatments associated with this alternative would likely be conducted after the nesting period. If suitable conditions for forest improvement activities did occur during the nesting period, precautions to minimize disturbance would be implemented by establishing buffer zones around rookery sites.

Other wildlife

Most wildlife species would benefit from forest improvement activities associated with the described alternative. The alternative seeks to increase forest diversity and forest productivity. Restoration of habitats and implementation of an uneven forest management regime provides the best likelihood of achieving and maintaining conditions believed biologically superior throughout the forested habitats of the affected area. Through this approach, tree species composition within the forest would be altered to re-establish a dominance of species biologically identified to benefit wildlife (i.e. mast producers, prone to cavity development, old age class component, etc.). Other

forest parameters such as basal area, age class, horizontal and vertical structure etc. are considered under this alternative with established targets based on indicator wildlife species habitat requirements believed to be representative of the general needs of all priority wildlife species.

Potential disturbance is a short-term negative impact associated with any alternative involving habitat improvement applications. Disturbance from habitat improvements activities implemented on the forested habitats of the refuge would be minimal due to the very limited annual scope and designed timing of proposed operations.

Negative impacts due to reduced rate/scope of proposed habitat improvement operations (i.e. potential for degraded habitats to continue to exist for an extended period). The physical limitations of treating only 100-150 acres per year would result in most of the refuge forest continuing in undesirable conditions for decades. Plant successional changes routinely result in productive hardwood forest stands attaining crown closure within 10-15 years following treatment. Given this fact, this action would be capable of providing only 1,200-1,500 acres of optimum forest habitat for priority species over the life expectancy of the habitat management plan.

Forest flora

Short and long-term positive impacts would be achieved through implementation of this described alternative. Restoration of hydrological functions, restoration of native bottomland hardwood species where conversion to pine species has occurred, re-establishment of forest species composition and forest structure would be achieved and maintained through this alternative. This alternative does not provide reasonable time-lines for accomplishing habitat needs due to funding and staffing shortages.

Short-term negative impacts include loss of forest connectivity. This loss of connectivity would be minimal under this alternative due to scope of annual treatments likely possible and recovery potential of the areas to be treated.

Possible negative impacts due to reduced rate/scope of proposed habitat improvement operations (i.e. potential for degraded habitats to continue to exist for an extended period). This alternative would result in off-site pine plantations (non-native communities) existing in excess of 60 years.

Archeological resources

Impacts to Archeological resource sites would not be incurred under this alternative. All documented sites would be mapped and disturbance negated through establishment of buffer zones around identified sites. All habitat improvement activities would be approved by the regional archaeologist and coordinated with the State Historic Preservation Officer (SHPO) prior to implementation.

Economic

This approach is the least economically feasible alternative. Based on current funding and staffing resources available, the scope of the proposed action will not accomplish habitat goals and objectives identified for this refuge. Lack of additional resources necessary to implement this alternative would degrade other refuge programs and refuge users. Effective implementation of this alternative would be funding dependent.

Social

This alternative would not address public concerns relative to habitat improvement initiatives discussed during the CCP planning process, not meet legal mandates and not achieve refuge habitat goals and objectives. Non-accomplishment of the habitat goals and objectives for this refuge would effectively decrease the areas ability to support increased populations of wildlife. This would negatively impact the likelihood of a quality refuge experiences for the visiting public, and not promote refuge use. Reduced refuge visitation would not provide any additional economic benefits to the local community.

Aesthetics

Short-term loss of aesthetics would occur from implementation of this alternative. This would occur primarily as a result of liquidation of the off-site pine plantations. Regeneration of hardwood species would occur rapidly eliminating long-term aesthetics impacts. However, additional impacts may be experienced due to piles or standing dead (chemical injected) timber viewed as marketable and as wasted. These impacts would be short-term as regeneration of the forest and decay or burning of piles created would occur directly.

No impact to aesthetics would be incurred from forest improvement activities conducted in hardwoods stands as only select trees or groups of trees would be removed.

B. Alternative 2. Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Harvest Actions (Preferred Alternative)

Soils

Positive impacts include lowered soil acidity levels on sites currently supporting off-site pine plantations. Restoration of these areas to native bottomland hardwood species within 6 - 10 years should restore soil biochemistry to its natural state and provide long-term indirect benefits to soil invertebrates, water chemistry and native vegetation associated with the affected areas.

This alternative would potentially have localized negative impacts due to the operation of equipment used to conduct silvicultural activities. Direct impacts could result from soil compaction or rutting in areas of high equipment use. To negate the potential for such impacts, silvicultural activities would only be conducted during summer months when dry conditions exist.

Best Management Practice (BMP), including buffer zones and stream side management zones, would be used to minimize possible impacts.

Soil Invertebrates

Long-term indirect benefits due to restoration of wetland functions through hydrology and forest restoration. Short-term localized negative impacts associated with use of equipment to conduct silvicultural activities through possible soil compaction.

Hydrology and Water Resources

Actions associated with this alternative would provide opportunities to restore hydrological functions in off-site pine plantations and throughout hardwood stands, where practical. During forest improvement activities, man-made lateral ditches facilitating drainage would be filled-in using existing spoil from their creation. Natural drainages plugged or altered from past silvicultural activities would also be restored to ensure conditions associated with unnatural inundation do not persist and further degrade existing forest habitats. Restoration of these wetland functions would provide long-term and direct positive contributions to water resources through filtration of sediments and reduced sedimentation from off-site activities. Indirect benefits to the protection of the regional aquifer are also anticipated.

Possible minor short-term negative effects associated with this alternative potentially include water quality issues associated with siltation caused by active silvicultural practices. These potential effects would be localized and minimized through planning and utilization of BMP's and stream side management zones. Timing, intensity, fragility of site, etc. would be considered thoroughly to negate these impacts prior to forest improvement activities.

Aquatic vertebrates and invertebrates

Long-term and indirect positive effects due to restoration of wetland functions through hydrological and forest improvement.

Possible short-term and direct negative effects associated with this alternative could include water quality issues associated with sedimentation caused through active silvicultural practices. These potential effects would be localized and minimized through planning and utilization of BMP's and stream management zones. Timing, intensity, site location, etc. would be considered thoroughly prior to implementation of all silvicultural activities and should result in negligible negative effects.

Threatened and endangered species (T&E)

Most T&E species at this refuge are riverine dependent and only occur in river systems or permanent water areas (mussels, leopard darter, alligator). Impacts and precautions identified relative to aquatic vertebrates and invertebrates apply to the consideration of potential impacts of

these species. Other T&E species (American Bald Eagle) may be directly impacted as a result of disturbance during silvicultural applications but such disturbance is not likely unless nesting or roosting is initiated on the refuge (currently, neither occurs). Before treatment, surveys will be conducted to document presence/absence of nests or roost sites. Eagles are most often present during the winter months when applications would not be implemented. This species should benefit indirectly in the long-term as the proposed action would maximize habitat diversity and productivity (i.e. increased availability of prey along with creation of habitat features attractive for nesting-- super-emergent canopy stems). Impacts to other T&E species (pondberry and American burying beetle) are not anticipated. Pondberry occurs in wet depressions with sandy soils. Any sites identified with these specific conditions would be excluded from any active silvicultural applications and surveys conducted to confirm presence/absence. The range of the American burying beetle includes the refuge but this species has not been identified as occurring.

Migratory waterfowl

This alternative would directly benefit waterfowl through increased productivity and usability of forests habitats. Restoration of wetland functions and increasing habitat productivity (i.e. removal of off-site pine, increasing composition of mast producing species, retention of cavity trees and trees species prone to produce cavities) would be achieved potentially on the entire 28,000 acre refuge forest during the life of this plan. These habitat improvements would result from conversion of monoculture pine plantations to native flood plain hardwoods and significant habitat improvements to existing hardwood stands from application of silvicultural techniques to correct over story species compositions, reduce over story basal areas, develop forest floor vegetation, etc.

No negative impacts anticipated.

Migratory songbirds

This alternative would directly benefit migratory songbirds by maximizing habitat productivity. Under this alternative, unproductive habitats (pine monoculture) would be removed and converted back to native tree species used by migrant songbirds. Hardwood stands decreased in productivity by past silvicultural practices would be improved through silvicultural applications that address internal structure of the forest to maximize horizontal and vertical structure, develop spatial elements considered optimum for songbird use, promote diversity of forest species composition and age classes, and provide "patchiness" (i.e. reproduction clumps coupled with early successional stage plants in relation to closed canopy or open stand conditions) on a micro scale ($\frac{1}{2}$ - 2 acres) throughout the forest. These components, identified critical by research scientists to productive songbird habitat, would be produced on the maximum amount of habitat through uneven-age management proposed by this alternative. Decisions to implement silvicultural treatments would be made based upon needs of individual stands or parts of stands in order to achieve mandated habitat conditions for priority wildlife species (see Section III.B., Draft FHMP).

Possible short-term indirect impacts would occur under this approach as a result of possible localized disturbance during applications in late summer. Most nesting will have ceased by the

onset of any silvicultural applications, therefore these impacts are believed to be negligible. Additional short-term impacts may result from a loss of connectivity or fragmentation created by removal of pine plantations. These impacts would be minimized by conducting removal over a period of 6 - 10 years and due to the release of hardwood regeneration in the under story. The effects of connectivity would be short in duration and would not be experienced as a result of future treatments due to the design of applications in hardwood stands.

Colonial nesting birds

Impacts to colonial nesting birds would be negligible under this alternative. Some indirect benefits may be associated with restoration of hydrological functions. Negative impacts are not anticipated as applications or treatments associated with this alternative would likely be conducted after the nesting period. If suitable conditions for forest improvement activities did occur during the nesting period, precautions to minimize disturbance would be implemented by establishing buffer zones.

Other wildlife

Most wildlife species would benefit from forest improvement activities associated with the described alternative. The alternative seeks to provide the greatest forest diversity and develop maximum forest productivity at a reasonable time interval that minimizes system disruptions and disturbances. Restoration of habitats and implementation of an uneven forest management regime provides the best likelihood of achieving and maintaining conditions believed biologically superior throughout the forested habitats of the affected area. Through this approach, tree species composition within the forest would be altered to re-establish a dominance of species biologically identified to benefit wildlife (i.e. mast producers, prone to cavity development, etc.). Other forest parameters such as basal area, age class, horizontal and vertical structure etc. are considered under this alternative with established targets based on priority wildlife species needs/requirements believed to be representative of the general needs of all wildlife species of concern. Implementing this proposed action presents the highest possibility of achieving native forest connectivity conditions and restoring forest integrity. Best science would be applied to accomplish wildlife and forest system improvements.

Potential disturbance is a short-term negative impacts associated with any alternative involving habitat improvement applications. Silvicultural related disturbance resulting from the proposed action of this alternative would be minimized by design in scope and timing of proposed applications. As proposed, implementation of this alternative would not result in the loss of or reduction of native flora and fauna.

Forest flora

Short and long-term positive impacts would be achieved through implementation of this described

alternative. Restoration of hydrological functions, restoration of native bottomland hardwood species where conversion to pine species has occurred, re-establishment of forest species composition and forest structure would be achieved and maintained through this alternative. This alternative provides the most reasonable approach to accomplishing refuge objectives.

Short-term negative impacts include loss of forest connectivity. This loss of connectivity would be short term and minimized due to scope of annual treatments considered under this alternative and recovery potential of treated areas.

Archeological resources

Impacts to archeological resource sites would not be incurred under this alternative. All documented sites would be mapped and disturbance negated through establishment of buffer zones around identified sites. All silvicultural activities would be approved by the regional archaeologist and coordinated with the SHPO prior to implementation.

Economic

This approach is economically feasible in that it utilizes commercial timber sales as a means for the deployment of stand improvement initiatives. Adequate staff and refuge resources necessary to implement this alternative currently exist and would not degrade other refuge programs.

Social

This alternative would address public concerns relative to habitat improvement initiatives discussed during the CCP planning process, meet legal mandates and achieve refuge habitat goals and objectives. Achievement of refuge habitat goals and objectives would effectively increase the areas ability to support increased populations of wildlife that could be sustained. This would presumably increase the likelihood of a quality refuge experiences for the visiting public and promote refuge use. Increased refuge visitation would provide increased economic benefits to the local community. It is also probable, that a few temporary jobs would be generated locally from silvicultural activities proposed by this alternative. The sale of timber products would also support local plywood and paper mills that help sustain the local economy.

Aesthetics

Short-term loss of aesthetics would occur from implementation of this alternative. This would occur primarily as a result of liquidation of the off-site pine plantations. Approximately, 800 - 1,200 acres of this habitat would be converted annually over a period of 6 - 10 years. Regeneration of hardwood species would occur rapidly eliminating long-term aesthetics impacts. No impact to aesthetics would be incurred from silvicultural activities conducted in hardwoods stands as only select trees or small groups of trees would be removed on areas treated.

C. Alternative 3. Active Forest Management with Conversion of Pine Plantations and Implementing Even-Age, Silvicultural Harvest Applications

Soils

Positive impacts include lowered soil acidity levels on sites currently supporting off-site pine plantations. Restoration of these areas to native bottomland hardwood species should restore soil biochemistry to its natural state and provide long-term indirect benefits to soil invertebrates, water chemistry and native vegetation associated with the affected areas.

This alternative would potentially have localized negative impacts due to the operation of equipment used to conduct silvicultural activities. Direct impacts could result from soil compaction or rutting in areas of high equipment use. To negate the potential for such impacts, silvicultural activities would only be conducted during summer months when dry conditions persist. BMP's, buffer zones and stream management zones would also be used to establish perimeters around areas considered saturated to prevent significant soil compaction or rutting.

Soil Invertebrates

Long-term indirect benefits due to restoration of wetland functions through hydrology and forest restoration. Short-term localized negative impacts associated with use of equipment to conduct silvicultural activities through possible soil compaction.

Hydrology and Water Resources

Actions associated with this alternative would provide opportunities to restore hydrological functions in off-site pine plantations and throughout about 15 percent of the hardwood stands, where practical. Total area potentially restored through use of timber sale permit requirements should be around 8,000 - 9,000 acres. During forest improvement activities, man-made lateral ditches facilitating drainage would be filled-in using existing spoil from their creation. Natural drainages plugged or altered from past silvicultural activities would also be restored to ensure conditions associated with unnatural inundation do not persist and further degrade existing forest habitats. Restoration of these wetland functions would provide long-term and direct positive contributions to water resources through filtration of sediments and reduced sedimentation from off-site activities. Minor benefits to the protection of the regional aquifer are also anticipated.

Possible short-term negative effects associated with this alternative potentially include water quality issues from siltation caused by active silvicultural practices. These potential effects would be localized and minimized through planning and utilization of BMP's and Stream side Management Zones. Timing, intensity, fragility of site, etc. would be considered thoroughly to negate these impacts prior to forest improvement activities.

Aquatic vertebrates and invertebrates

Long-term and indirect positive effects due to restoration of wetland functions through hydrological and forest improvement on about 8,000 - 9,000 acres.

Possible short-term and direct negative effects associated with this alternative might include water quality issues associated with increased sedimentation due to active silvicultural practices. These potential effects would be localized and minimized through planning and utilization of BMP's and stream management zones. Timing, intensity, site location, etc. would be considered thoroughly prior to implementation of all silvicultural activities and should result in minimizing negative effects. Due to the mechanics of implementing an even-age management system (egg. exclusively using clear-cut), potential negative impacts to aquatic systems are significantly greater than the preferred alternative since this approach would result in 800 - 1,000 acres of hardwood forest being annually clear-cut (removed of all standing woody vegetation).

Threatened and endangered species (T&E)

Most T&E species are riverine dependent and only occur in river systems or permanent water areas (mussels, leopard darter, alligator). Impacts and precautions identified relative to aquatic vertebrates and invertebrates apply to the consideration of potential impacts of these species. Other T&E species (American bald eagle) may be directly impacted as a result of disturbance during silvicultural applications but such disturbance is not likely unless nesting or roosting is initiated on the refuge (currently, neither occurs). Eagles are most often present during the winter months when applications would not be applied. This species should benefit indirectly in the long-term as the proposed action could increase habitat diversity and productivity (i.e. increased availability of prey) on approximately 15 percent of refuge habitats. Impacts to other T&E species (pondberry and American burying beetle) are not anticipated. Pondberry occurs in wet depressions with sandy soils. Any sites identified with these specific site conditions would be extensively surveyed for presence of this plant and if found, the area excluded from any active silvicultural application. The range of the American burying beetle is within the affected area but this species has not been identified to occur in the associated area of treatment.

Migratory waterfowl

This alternative would indirectly benefit waterfowl through increased productivity and usability of forests habitats on roughly 15 percent (3,000 acres) of refuge hardwood habitats during the life of this plan. Restoration of wetland functions and increasing habitat productivity (i.e. removal of off-site pine) would also be achieved.

No negative impacts anticipated.

Migratory songbirds

This alternative would directly benefit migratory songbirds by increasing habitat diversity and productivity. Under this alternative, unproductive habitats (pine monoculture) would be removed and converted back to native tree species used by migrant songbirds. Actions to address habitat

needs for most priority passerine bird species in hardwood stands decreased in productivity by past silvicultural practices would not be improved through even age management silvicultural applications. This management approach restricts actions to implementing small 20-100 acre clear-cuts based solely upon strict area control (total number of forested acres divided by the rotation age equals average to treat annually). Improvements to existing internal stand structure, age and species distributions would not occur. This management approach strives to maintain patches (egg. prior clearcuts at various stages of development) to assure all possible needed habitat parameters for priority wildlife species are present at least somewhere within the forest. Given the physical limitations of this system, roughly 20 percent of the entire forest throughout the 100 year rotation age would exist as early successional to small sapling size habitat conditions at any given time. Approximately 10 percent of the forest would provide older age class characteristics and roughly 50-60 percent would be categorized as in the pulpwood/saw-log size class. Availability of desirable habitat conditions for forest birds would vary widely- under story dependent birds should find good habitat on 10 percent of area, mid-story dependent birds should have acceptable on roughly 20 - 30 percent of the area, while canopy dwelling birds should find suitable conditions on roughly 50% of the area. These percentages given are only estimates and vary widely dependent upon many factors. They are mentioned simply to demonstrate the limitations of this approach to achieving desired conditions mandated by optimum management for priority migratory forest bird species at this refuge. In direct comparison to Alternative 2, only "thicket" dwelling birds (birds utilizing dense under story habitats) would find improved habitat conditions. Those species utilizing other forest strata will experience a net habitat loss due to plant successional changes creating closed canopy conditions on much of the forest.

Possible short-term indirect impacts might occur under this approach as a result of possible localized disturbance during applications in late summer. Most nesting would have ceased by the onset of any silvicultural applications, therefore these impacts are believed to be negligible. Additional short-term impacts may result from a loss of connectivity or fragmentation created by removal of pine plantations and clear cuts associated with even age management. Impacts associated with pine plantation removal would be reduced by a gradual removal approach and due to the immediate release of hardwood regeneration in the under story that would occur on most sites. However, connectivity loss associated with even age management of hardwood forests would be present continuously. Efforts to minimize the effects would occur through harvest design within management compartments.

Colonial nesting birds

Impacts to colonial nesting birds would be negligible under this alternative. Some indirect benefits may be associated with restoration of hydrological functions. Negative impacts are not anticipated as applications or treatments associated with this alternative would likely be conducted after the nesting period. If suitable conditions for forest improvement activities did occur during the nesting period, precautions to minimize disturbance would be implemented by establishing buffer zones.

Other wildlife

Wildlife species dependent upon edge and/or early successional stage habitat (deer, small mammals, some raptor species, etc) would benefit from forest improvement activities associated with the described alternative. However, little if any long term habitat productivity improvements can be expected for other priority species during the 15 year life expectancy of this plan under this alternative since these conditions will develop only after 30 - 40 years of treatment implementation

Potential disturbance is a short-term negative impacts associated with any alternative involving habitat improvement applications. Silvicultural related disturbance resulting from the proposed action of this alternative would be minimized by design in scope and timing of proposed applications.

Forest flora

Short and long-term positive impacts would be achieved through implementation of this described alternative. Restoration of hydrological functions and restoration of native bottomland hardwood species where conversion to pine species has occurred would be achieved and maintained on part of the refuge through this alternative. This approach provides the best silvicultural practices to reproduce shade intolerant hardwood species such as oaks, a desirable component of the forest due to hard mast production and wildlife dependency.

Short-term negative impacts include loss of forest connectivity. This loss of connectivity would be short term in pine plantations removed and hardwood areas clear-cut due the recovery potential of the area. However, because rotational or cyclic cuts of relatively large areas are the basis for an even age management approach, loss of connectivity would persist long-term to some degree. This would not occur as a result of any one site but as a result of timed treatments that ensure all successional stages are present throughout the forest. This management approach does not provide an opportunity to develop forest horizontal and vertical diversity within stands except in discrete patches of habitat. These critical features to habitat productivity quickly change within individual stands (10 - 15 years) and must be provided in other sites within the forest. Forest habitat productivity for priority wildlife species is reduced significantly by limitations of this alternative compared to the preferred alternative.

Archeological resources

Impacts to archeological resource sites would not be incurred under this alternative. All documented sites would be mapped and disturbance negated through establishment of buffer zones around identified sites. All silvicultural activities would be approved by the regional archaeologist and coordinated with the SHPO prior to implementation.

Economic

This approach is the most economically feasible because applications include total removal of trees from a designated area, thereby reducing operational overhead. It utilizes commercial timber

sales as a means for the deployment of stand improvement initiatives . Adequate staff and refuge resources necessary to implement this alternative currently exist and would not degrade other refuge programs.

Social

This alternative would partially address public concerns relative to habitat improvement initiatives discussed during the CCP planning process but does not achieve refuge habitat goals and objectives on the bulk of refuge forested acreage due to limitations of the even age management system.. The degree to which refuge habitat goals and objectives would effectively be met would increase the areas ability to support increased populations of wildlife that could be sustained. This would presumably increase the likelihood of a quality refuge experiences for the visiting public, and promote refuge use. Increase refuge visitation would provide increased economic benefits to the local community. It is also probable, that a few temporary jobs would be generated locally from silvicultural activities proposed by this alternative. The sale of timber products would also support local plywood and paper mills that help sustain the local economy.

Aesthetics

Loss of aesthetics would occur from implementation of this alternative. This would occur as a result of liquidation of the off-site pine plantations and rotational clear-cutting of hardwood stands. Approximately 700-1,000 acres of hardwood forest would be clear-cut annually. Regeneration of hardwood species would occur rapidly reducing long-term aesthetics impacts at individual treated sites treated. However, since rotational clear-cutting is associated with an even age management approach, continued loss of aesthetics at the rates identified on an annual basis would occur throughout the life-expectancy of this plan.

D. Alternative 4. Natural Succession (No Action)

Soils

This alternative would negate any potential negative impacts due to the operation of equipment used to conduct silvicultural activities described by the other proposed actions as no active forest management is proposed.

Possible negative impacts include continued elevated acidity levels on sites currently supporting off-site pine plantations. These impacts would naturally subside over time through successional processes that would progressively move towards restoration of mixed pine/hardwood communities. Adequate recovery could be expected in 100 - 120 years.

Soil Invertebrates

This alternative would negate any potential negative impacts due to the operation of equipment

used to conduct silvicultural activities described by the other proposed actions as no active forest management is proposed.

Potential long-term localized negative impacts due to lack of active restoration of sites supporting off-site pine plantations with resulting altered soil biochemistry.

Hydrology and Water Resources

This alternative would negate any potential negative impacts due to the operation of equipment used to conduct silvicultural activities described by the other proposed actions as no active forest management is proposed.

Actions to restore hydrology would not be conducted under this alternative due to standing timber. Man-made ditches facilitating drainage and culvert crossings created during logging operations (most are now collapsed and restricting drainage) were created when the land was cleared. Regeneration of forest stands have reduced opportunities to restore hydrological functions on a large scale due to a restricted ability to utilize heavy equipment. Ditches facilitating drainage and natural drains plugged would be filled or excavated by refuge staff where feasible under the no action alternative. However, further degradation of habitat will occur due to the limited scope of hydrology restoration. This continued degradation would reduce wetland functions, continue rapid plant successional changes to wetter or drier site tree species and have localized negative effects on hydrology and water resources of the area.

Aquatic vertebrates and invertebrates

This alternative would negate any potential negative impacts due to the operation of equipment used to conduct silvicultural activities described by the other proposed actions as no active forest management is proposed.

Long-term and indirect negative effects due to lack of wetland function restoration through limited hydrological and no forest improvement actions.

Threatened and endangered species (T&E)

Most T&E species are riverine dependent and only occur in river systems or permanent water areas (mussels, leopard darter, alligator). Impacts and precautions identified relative to aquatic vertebrates and invertebrates apply to the consideration of potential impacts of these species. Other T&E species (American bald eagle) may be indirectly impacted due to long-term reduction in habitat diversity and productivity created by past silvicultural activities. Impacts to other T&E species (pondberry and American burying beetle) would not occur unless affected by closed canopy and shading of under story predictable of the proposed action or negatively impacted by modified hydrological functions.

Migratory waterfowl

This alternative would significantly impact refuge waterfowl populations through long term reduced habitat quality. Forest tree species composition currently does not have a preponderance of mast producing species due to past high grading operations conducted by the previous landowner. Rapid canopy closure resulting from this alternative will effectively eliminate forest floor vegetation. As a result habitat quality will unquestionably deteriorate. Reduced hydrological restoration and continued existence of non-productive pine plantation habitats also contribute to reduced waterfowl habitat productivity. Refuge population objectives will not be achieved.

Migratory songbirds

This alternative would minimize any potential negative impacts due to the operation of equipment and related disturbance factors.

This alternative provides significant long term negative impacts to migratory songbirds by decreasing habitat diversity and productivity. Under this alternative unproductive habitats (pine monoculture,) would persist for decades reducing available habitat for songbirds. Hardwood forest conditions determined as optimum by Service and non-service experts would not be promoted and would exist subject to natural processes (storm events, etc.) It is estimated that no more than 1 - 5 percent of the existing forest would provide optimum songbird habitat through successional processes alone during the life of this plan. The no action approach would diminish internal stand structure, stand species composition, regeneration and spatial elements identified as critical to achieve productive forest bird habitat. Refuge population objectives for priority species will not be achieved.

Colonial nesting birds

Impacts to colonial nesting birds would negligible under this alternative. Any potential for disturbance from silvicultural activities would be negated by this action. Some indirect negative impacts may result from reduced restoration of hydrological functions.

Other wildlife

Negative wildlife impacts relative to disturbance associated with silvicultural activities would not occur under the no action alternative.

The no action alternative would not provide for restoration of unproductive habitats (pine monocultures) or improvement of other altered habitats. These altered habitats are less diverse and productive than believed suitable to fully address need/requirements of many species of wildlife. Existing habitat productivity would not be enhanced under the no action alternative and would be expected to further deteriorate as natural successional processes proceed to a state of canopy closure.

Forest flora

The no action alternative would contribute to decreasing forest connectivity or fragmentation. Uniformity throughout the forest should develop within a short time period leading to canopy closure and further reduction in forest diversity, especially in the ground story and midstory communities. Regeneration of forest tree species would be minimized under these conditions. Forest flora would be impacted negatively under this approach long-term. Reduced scope of hydrological restoration, lack of active restoration of pine plantations and re-establishment of forest species composition would also contribute significantly to the reduction of forest diversity.

Archeological resources

Impacts to Archeological resource sites would not be incurred under this alternative as no active silvicultural activities would occur.

Economic

This approach would require the least amount of refuge staff and funding resources and would not directly impact or degrade other refuge programs.

Social

This alternative would not address community concerns relative to habitat improvement initiatives discussed during the CCP planning process, meet legal mandates or achieve refuge wildlife habitat goals and objectives. Habitat productivity achieved would be the least under this alternative and would contribute to reduced levels of sustainable wildlife resources. This would indirectly decrease the likelihood of a quality refuge experiences for the visiting public, and not promote refuge use. Significant increases in refuge visitation would not be expected nor additional economic benefits to the local community. The lack of silvicultural activities would not provide any additional temporary jobs locally or make available any timber resources that would support local economics associated with the local timber products industry.

Aesthetics

Loss of aesthetics would not result from silvicultural activities potentially resulting from other alternatives considered. However, decreased aesthetics associated with off-site pine plantations would continue to persist long-term.

V. Re-evaluation of Plan

This Environmental Assessment for the proposed habitat management plan for Pond Creek National Wildlife Refuge will be considered valid and effective, once approved, until the year 2017. However, unforeseen events or major changes identified during annual review of the program may dictate a re-evaluation of the plan prior to this date.

VI. List of Preparers

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VII. Literature Cited

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Table 1. Responsiveness of Alternative to Issues and Concerns

Issues and concerns	Alternative 1. Active Mgmt. No Commercial Sales	Alternative 2. Active Mgmt. Commercial Sales Uneven Age Approach (Pref. Alt.)	Alternative 3. Active Mgmt Commercial Sales Even Age Approach	Alternative 4. Natural Succession (No Action Alt.)
Preserve Archeological sites on refuge	All sites preserved; staff implemented management actions only minimizes potential impacts; coordination with State Historic Preservation Officer prior to implementing any silvicultural action.	Negligible affects due to silvicultural operations possible; all known sites preserved; safeguards to prevent disturbance incorporated in all permits authorizing activities; careful coordination with State Historic Preservation Officer prior to implementing any silvicultural action.	Minimal affects due to silvicultural operations possible; risks increase slightly due to higher level of disturbance caused by clearcutting; safeguards to prevent disturbance incorporated in all permits authorizing sale activities; coordination with State Historic Preservation Officer prior to implementing any silvicultural action.	All sites preserved
Protect Threatened and Endangered Species (T&E species)	T & E species protected; little if any habitat improvements implemented due to being able to treat only 100 - 150 acres annually; no population improvements expected.	T&E species protected; habitat improvements could be implemented on the entire 28,000 acres of refuge forest during the life of this plan; some on-refuge population improvements possible due to improved habitat conditions.	T&E species protected; habitat improvements could be implemented on about 8,000 - 9,000 acres during life of this plan; minimal on-refuge population improvements possible.	T&E species protected; no habitat improvements possible; possible reductions in existing on-refuge population levels
Increase waterfowl populations [on-refuge] by restoring native bottomland hardwoods	Virtually no improvements in on-refuge waterfowl populations; this alternative could only provide improved habitat conditions on 100 - 150 acres annually. Hydrological restoration completed on these 100-150 acres might provide minor improvements.	Off-site monoculture pine plantations converted to native bottomland hardwoods in 10 years; management actions (individual tree selection harvest) implemented throughout the existing 21,000 acres of hardwood forest to improve habitat productivity (species compositions and age class distributions); most needed hydrological restoration completed; on-refuge population increase expected.	Off-site monoculture pine plantations converted to native bottomland hardwoods in 10 years; management actions (clearcuts) implemented on roughly 3,000 acres during life of this plan to began correcting hardwood species diversity and age distributions; hydrological restoration completed on pine plantation area (6,000 acres) and within treatment areas in existing hardwood stands (3,000 acres); some habitat improvements result, some possible population increase across time.	No direct improvements; minor changes in the forest community due to natural plant successional changes within the 15 year life expectancy of this plan; forest canopy closure will result in loss of most forest floor and understory vegetation; no hydrological restoration. Waterfowl populations expected to decrease across time.

Table 1. Responsiveness of Alternative to Issues and Concerns (Cont.)

Issues and concerns	Alternative 1. Active Mgmt. No Commercial Sales	Alternative 2. Active Mgmt. Commercial Sales Even Age Approach	Alternative 3. Active Mgmt. Commercial Sales Even Age Approach	Alternative 4. Natural Succession (No Action Alt.)
Are habitat improvements for non-game (forest dwelling) birds going to be developed?	Improvements implemented on 100 - 150 acres annually; little improvement expected refuge wide due to small acreage treated; losses in habitat productivity expected across time due to forest canopy closure on the remainder of the refuge forest; low productivity pine plantations exist for 60 plus years	Maximizes possible habitat improvements for largest array of priority bird species suites; silvicultural actions to improve spatial/horizontal/vertical stand diversity could be applied to entire 21,000 acres of existing hardwood forest during the life of this plan; re-establishment of native hardwoods on 6,000 acres currently occupied with pine plantations completed.	Desirable habitat conditions for 'thicket' dwelling bird species suites is maximized; refuge wide needed habitat conditions established in blocks of similar habitat; roughly 3,000 acres of existing hardwood stands treated through clearcuts during life of this plan to begin addressing long-term habitat needs; re-establishment of native hardwoods on 6,000 acres currently occupied with pine plantations completed.	No direct improvements, forest canopy closure will result in loss of most internal forest stand structure, habitat productivity and population levels expected to decrease significantly for forest birds during the life of this plan.
Improve habitat for resident wildlife	Provides for habitat improvement on 100 - 150 acres annually; little if any overall refuge wide improvement expected	Maximizes possible habitat improvements for largest array of wildlife species; low intensity/low impact silvicultural actions to correct stand conditions could be applied across entire 21,000 acres of existing hardwood forest during the life of this plan; re-establishment of native hardwoods on 6,000 acres currently occupied by pine plantations completed	Desirable habitat conditions established in blocks of similar habitat; roughly 3,000 acres of existing hardwoods treated during life of this plan; re-establishment of native hardwoods on 6,000 acres currently occupied with pine plantations completed. Species best suited to early successional and edge habitats created by clearcuts (deer, rabbit, some non-game birds) would receive most benefit. Some long-term habitat loss due to stand closure in clearcuts after roughly 10-15 years.	No direct habitat improvements; habitat conditions deteriorate across time due to stand canopy closure and perpetual existence of low productivity pine plantation habitats.
Off site pine plantations should be converted to back to bottomland hardwood community; change rotation of pine harvest regime for conversion of these pine plantations from a 30 year period to a faster 10 year period.	Converted to hardwoods in approximately 60 years	Converted to hardwoods in approximately 6-10 years	Converted to hardwoods in approximately 6-10 years	Not removed; plant successional changes across time (100 - 120 years) will eventually result in development of mixed species tree compositions
Bird rookery sites should be undisturbed	Staff conducted management actions only virtually eliminates any disturbance to bird rookeries	Slightly increased risk of disturbance; very minimal and insignificant. Buffer zones (no entry) established around all known sites; silvicultural actions restricted to non-nesting times of the year.	Same as Alternative 2	All sites will be undisturbed.
Bottomland hardwood stands should have appropriate basal areas [to encourage development of stand canopy layers for good wildlife habitat]	Provides virtually no capability of establishing and maintaining optimum basal area levels for forest floor, understorey and mid-story vegetation establishment	Provides the capability of establishing and maintaining optimum basal area levels for forest floor, understorey and mid-story canopy layer development throughout the 21,000 acres of existing hardwood forest.	Provides no capability of establishing and maintaining optimum basal area levels within existing hardwood stands for development of forest floor, understorey and mid-story canopy layers.	Cannot maintain basal area levels that results in multiple canopy layer development within the existing hardwood forest stands. Complete canopy closure will occur within 10 - 15 years.
Hydrology	Restoration conducted on high priority areas; extended period required to complete substantive improvements in degraded conditions	All practical restoration completed during the 15 year time period covered by this plan; least time period to complete	All practical restoration completed within areas scheduled for silvicultural actions during the life of this plan (on the 6,000 acres of pine plantations and about 2,000 acres of hardwoods)	No hydrological restoration
Staffing / Funding [levels] limits activities performed on refuge	Current levels limits habitat improvement activities to 100 - 150 acres per year	Utilizing standard Service timber harvest procedures provides opportunities to implement needed habitat improvements throughout the refuge forest	Utilizing standard Service timber harvest procedures provides opportunities to implement needed habitat improvements on at least part of the refuge forest.	No habitat management action implemented; staffing/funding levels do not affect.

Table 2. Environmental Consequences of Alternatives

Impact Topic	Alternative 1. Active Mgmt. No Commercial Sales	Alternative 2. Active Mgmt. Commercial Sales Uneven Age Approach (Pref. Alt.)	Alternative 3. Active Mgmt Commercial Sales Even Age Approach	Alternative 4. Natural Succession (No Action Alt.)
Soils	Possible minor impacts associated with soil compaction, rutting during push/pile activities on 100 - 150 acres annually; dry season only activities and BMP's implemented; positive indirect impacts from reduced acidity when removal of pine plantations completed (approximately 60 years)	Possible low level direct impacts associated with soil compaction and rutting; dry season only activities and BMP's implemented to minimize impacts; positive indirect impacts from reduced acidity when removal of pine plantations completed (approximately 6-10 years)	Possible moderate level direct impacts associated with soil compaction and rutting due to large scale clearcutting; dry season only activities and BMP's implemented to minimize impacts; positive indirect impacts from reduced acidity when removal of pine plantations completed (approximately 6-10 years)	No impacts resulting from planned silvicultural activities; Indirect negative impacts from continued existence of pine plantations and elevated acidity levels and reduction in function of natural hydrological processes
Soil Invertebrates	Possible minor impacts associated with soil compaction, rutting during push/pile activities on 100 - 150 acres annually; positive impacts from reduced acidity when removal of pine plantations completed (approximately 60 years)	Possible low level direct short term impacts associated with soil compaction and rutting during harvest activities; dry season only activities and BMP's implemented; positive indirect impacts from reduced acidity when removal of pine plantations completed (approximately 6-10 years)	Possible moderate level direct impacts associated with soil compaction and rutting due to large scale clearcutting; dry season only activities and BMP's implemented; positive indirect impacts from reduced acidity when removal of pine plantations completed (approximately 6-10 years)	No impacts resulting from planned silvicultural activities; indirect negative impacts from continued existence of pine plantations and elevated acidity levels and reduction in function of natural hydrological processes
Hydrology and Water Resources	Possible minor impacts associated with increased risk of siltation from push/dig/pile actions on 100 - 150 acres annually; improvements include restored hydrological processes on about 2,250 acres achieved during life of plan.	Possible short term, low level impacts from increased siltation due to silvicultural actions; dry season activities only, stream side management zones and BMP's implemented. Positive impacts include at least partially restored natural hydrological processes on 28,000 acres of refuge forest.	Possible moderate level, short term impacts associated with increased risk of siltation from clear-cut actions; dry season activities only, stream side management zones and BMP's implemented. Positive impacts include at least partially restored hydrological processes on 8 - 9,000 acres of refuge forestland during the life of this plan.	No impacts from planned silvicultural activities; continued significant long-term negative impacts to refuge flora and fauna due to current modified hydrological processes caused by ditching, channelization and presence of elevated roadways with inadequate openings in floodplain topography
Aquatic vertebrates and invertebrates	Same as Hydrology and Water Resources topic above	Same as Hydrology and Water Resources topic above; partially restored hydrological processes would provide improved habitat conditions throughout the 27,000 acres of wetland forest.	Same as Hydrology and Water Resources topic above; partially restored hydrological processes would provide improved habitat conditions on 8 - 9,000 acres of wetland communities	Same as Hydrology and Water Resources above

Table 2. Environmental Consequences of Alternatives (Cont.)

Impact Topics	Alternative 1. Active Mgmt. No Commercial Sales			Alternative 2. Active Mgmt. Commercial Sales Uneven Age Approach (Pref. Alt.)		Alternative 3. Active Mgmt Commercial Sales Even Age Approach		Alternative 4. Natural Succession (No Action Alt.)	
Threatened and Endangered Species	Possible minor increased risks of on and off site siltation due to management actions; possible benefits from hydrology restoration on 2,250 acres achieved during life of plan; continued long term existence of low productive habitats; would probably not contribute to on-refuge population goals.			Habitat improvement possible throughout the 28,000 acre refuge forest during life of plan; low productivity pine plantation habitats eliminated; increase in habitat productivity long term; possible contributions to on-refuge population goals; on and off site benefits to riverine species due to hydrology restoration; possible minimal short term negative impacts associated with increased siltation and temporary loss of connectivity		Long term habitat improvement possible on about 8 - 9,000 acres of refuge forest during the life of this plan; low productivity pine plantation habitats eliminated; minor on and off-site benefits to riverine species due to hydrology restoration; possible increased risk of siltation and loss of connectivity from clearcutting compared to other alternatives; would probably not contribute to on-refuge population goals in the short term.		No impacts from planned silvicultural activities; continued significant long-term negative impacts to refuge flora and fauna due to presence of modified hydrological processes; existence of low productivity pine plantation habitat and lack of needed improvement actions to meet habitat needs; no loss of connectivity	
Waterfowl	No direct impacts from management actions; long term negative impacts due to extended life of low productivity habitats both within existing hardwood stands and in pine plantations; would contribute little if any improvement to meeting on-refuge population goals; possible minor benefits from hydrology restoration on 2,250 acres during the life of this plan.			Minimal to no direct impacts associated with planned management actions; habitat improvements possible throughout the 28,000 acre refuge forest during the life of plan; increase in habitat productivity long term both within existing hardwood stands and from re-establishment of over 6,000 acres of bottomland hardwoods; contributions to refuge population goals probable; some benefits from hydrology restoration within the entire forest also likely.		Minimal to no direct impacts associated with planned management actions; some long term habitat improvement possible on the 8 - 9,000 acres that would be treated during the life of this plan, including re-establishment of over 6,000 acres of bottomland hardwoods; possibly contribute to refuge population goals; some benefits from hydrology restoration implemented on this 8 - 9,000 acres; impacts due to loss of connectivity maximized; impacts due to crown closure within young stands created by clearcuts will persist for 15 - 20 years.		No impacts associated with planned silvicultural activities; significant long term negative impacts to refuge waterfowl resources from perpetual existence of low productivity habitats and altered hydrology; negative impacts due to future canopy closure and reduced habitat quality; no impacts from loss of connectivity	

Table 2. Environmental Consequences of Alternatives (Cont.)

Impact Topics	Alternative 1. Active Mgmt. No Commercial Sales	Alternative 2. Active Mgmt. Commercial Sales Uneven Age Approach	Alternative 3. Active Mgmt Commercial Sales Even Age Approach	Alternative 4. Natural Succession (No Action Alt.)
Migratory songbirds	Minimal to no direct impacts associated with management action; direct negative impacts to habitat productivity due to extended life of poor quality habitats since only 2,250 acres would be potentially treated over the life of this plan; on-refuge species diversity and population goals would not be achieved.	Maximizes direct and indirect benefits through increased habitat improvement - possible to the entire 28,000 acre forest during life of plan; increase in habitat productivity long term by providing opportunities for addressing spatial, horizontal, vertical internal stand diversity habitat needs critical to providing priority passerine forest bird habitat; contributes to on-refuge population goals for multiple suites of birds; minimal impacts due to loss of connectivity; minimal short term impacts due to disturbance during harvest activities	Direct positive impacts for "thicket dwelling" suites of birds; provides little if any avenue to address habitat needs of other priority species; minimal increase in habitat productivity long term since only about 3,000 acres of existing hardwood forest would be treated during life of this plan; would not contribute to on refuge population goals except for understory dependent species; impacts due to loss of connectivity maximized; minimal to moderate level of disturbance to forest birds due to clearcutting activities	No direct impacts associated with planned management actions; significant long term negative impacts from perpetual existence of low productivity habitats and altered hydrology; non-native stands of poor habitat quality pine plantations will exist for in excess of 100 years; negative impacts due to future canopy closure and reduced habitat quality; on refuge population goals will never be achieved; no impacts from loss of connectivity or from disturbance
Colonial nesting birds	Minimal to no effect; staff conducted management actions only avoids all potential nesting sites	Possible minimal impacts associated with disturbance; BMP's, buffer zones, streamside management zones and harvest activities outside of nesting season implemented to address this potential impact; minor possible improvements due to restored hydrology.	Possible minimal to moderate impacts associated with increased level of intensity of actions inherent in clearcutting; BMP's, buffer zones, streamside management zones and harvest activities outside of nesting season implemented to address this potential impact; risks of negative impacts due to sedimentation associated with clearcutting increased	Minimal impacts; possible negative impact due to reduced hydrology restoration
Other wildlife	Minimal direct impacts; Indirect negative impacts due to extended life of low productivity habitats; minimal impacts due to loss of connectivity	Maximizes direct and indirect benefits through increased habitat improvement possible during life of plan; increase in habitat productivity long term; contributes to population goals; harvest activities generates some unavoidable levels of short term disturbance and displacement but no effect on long term populations	Minimal direct short term positive impacts; minimal to no increase in long term habitat productivity due to stand closure in young stands; would contribute to on refuge population goals of species dependent upon edge, early successional habitat; impacts due to loss of connectivity maximized	No impacts associated with planned management actions; substantial long term negative impacts from perpetual existence of low productivity habitats and altered hydrology; negative impacts due to future canopy closure and reduced habitat quality; no impacts from loss of connectivity

Table 2. Environmental Consequences of Alternatives (Cont.)

Impact Topics	Alternative 1. Active Mgmt. No Commercial Sales	Alternative 2. Active Mgmt. Commercial Sales Uneven Age Approach (Pref. Alt)	Alternative 3. Active Mgmt Commercial Sales Even Age Approach	Alternative 4. Natural Succession (No Action Alt.)
Economic	Significant additional Service funding resources required; excess forest products not sold - allowed to rot in the woods	Modest additional Service funding resources required; excess forest products sold to private sector according to Service standards; provides substantial community benefits through income to private sector	Modest additional Service funding resources required; excess forest products sold to private sector according to established Service standards; provides substantial community benefits through income to private sector	No additional Service funding resources required; no income generated to private sector
Social	Public concerns, legal mandates, refuge habitat goals and objectives not met; would not promote refuge use; insignificant community benefits	Public concerns, legal mandates, refuge habitat goals and objectives met; would promote refuge use; modest community benefits	Public concerns, legal mandates, refuge habitat goals and objectives partially met; would not promote refuge use; insignificant community benefits	Public concerns, legal mandates, refuge habitat goals and objectives not met; would not promote refuge use; insignificant community benefits
Aesthetics	Decreased significantly due to prolonged existence of pine plantations, push/dig/pile operations and piles of marketable tree stems	Minimal short-term decrease due to removal of pine plantations and loss of connectivity	Moderate short-term decrease due to clear-cut management approach in hardwood stands and loss of connectivity	Decreased due to continued existence of pine plantations

Section 7

Vicinity Map

Map of Refuge